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ABSTRACT

Research measured the attention of deaf children to captioned visuals using a conjugate reinforcement procedure. The subjects were six deaf children aged eight to 15, whose IQs fell within the normal range. The stimulus material consisted of slides produced from a captioned filmstrip; subjects controlled the presentation of the stimulus via a pressing response. The results of the study failed to indicate any difference between attention to captioned visuals and attention to non-captioned visuals. No optimal words-per-minute presentation rate appeared. The researcher hypothesized that these negative findings may have been attributable to the small sample size and therefore recommended that the study be replicated with a larger sample. (PB)

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OBSERVATIONAL REPORT #7318
Ronald E. Nomeland
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THE USE OF REINFORCEMENT PROCEDURES TO MEASURE ATTENTION TO VISUALS AND CAPTIONS WITH DEAF STUDENTS

Ronald E. Nomeland

ABSTRACT

The purpose of this study was to measure the attention of deaf children to captioned visuals using a conjugate reinforcement procedure. The subjects were six deaf children, aged eight to fifteen, whose IQ's fell within the normal range. The stimulus material consisted of slides produced from a captioned filmstrip. The presence of the stimulus was contingent on a pressing response from the S. The study failed to produce any significant results vis-a-vis captioned vs. non-captioned visuals and optimal words per minute for presentation. The author attributes this failure to the small sample tested, and recommends replication of the study with a larger sample and minor modifications.

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SPECIAL REPORT No. 7318
COMPUTER-BASED PROJECT for the EVALUATION of MEDIA for the HANDICAPPED

Title: THE USE OF REINFORCEMENT PROCEDURES TO MEASURE ATTENTION TO VISUALS AND CAPTIONS WITH DEAF SUBJECTS

BY: Ronald E. Nomeland

BACKGROUND

The Computer Based Project for the Evaluation of Media for the Handicapped, based on contract #OEC-9-423617-4357 (616) between the Syracuse (N.Y.) City School District and the Media Services and Captioned Films Branch, Bureau of Education for the Handicapped (United States Office of Education) for the five year period July 1, 1969 through June 30, 1974. The major goal is to improve the instruction of handicapped children through the development and use of an evaluation system to measure the instructional effectiveness of films and other materials with educable mentally handicapped (EMH) children, in-service training and media support for special teachers, and studies related to the evaluation process and the populations used.

The Project has concentrated on the 600 films and 200 filmstrips from the Media Services and Captioned Films (BEH - USOE) depository; however, specific packages from Project LIFE, various elementary math curricula, and selected programs from Children's TV Workshop have also been evaluated. The evaluation model used requires that: 1) objectives of materials be specified and written; 2) instruments be constructed to test and measure effectiveness; and, 3) children be the major sources of evaluation information. A number of instruments and methodologies are employed in the gathering of cognitive and affective data from 900 EMH children and 80 special teachers to make the effectiveness decisions. Over half of the EMH population can neither read or write; therefore, a unique Student Response System (SRS) is employed, consisting of a twenty station G.E.-1000 SRS which can be operated in a group or individual recording mode and is connected to a remote computer system. The computer capabilities consist of remote telephone connections to the Rome (N.Y.) Air Development Command, the Honeywell time-shared network, and the Schenectady (N.Y.) G E Research and Development Center; and batch mode capabilities of the Syracuse City Schools, Syracuse University, and various commercial sources.

In-service and media support activities provide on-the-job training for teachers, teacher aides, equipment, and materials to the special teachers in the city schools. The research activities have centered around investigations and special problems related to the development of the evaluation model. The four major areas considered are: 1) testing effects, 2) captioning effects, 3) special student characteristics; and, 4) evaluation procedures validation.

Documentation of the major activities appear in the five annual reports and the 600 evaluations prepared on materials used. Staff members were encouraged to prepare special reports and the attached paper is one of these. The opinions expressed in this publication do not necessarily reflect the position or policy of the Computer Based Project, the United States Office of Education, or the Syracuse City School District, and no official endorsement by any of the agencies should be inferred.

Observational Report 7318
Ronald E. Nomeland
August 1973

THE USE OF REINFORCEMENT PROCEDURES TO MEASURE ATTENTION TO VISUALS AND CAPTIONS WITH DEAF SUBJECTS

Several research studies (Fischer, 1971; Nix, 1971; Davila, 1972; Nomeland, 1973) have indicated that captioned films and slides, as produced for deaf learners, contribute to higher performance than non-captioned versions. Investigations employing captioned videotape (Gates, 1970; Propp, 1972) also suggested the positive effects of captioned verbal matter over other forms of communication such as lip reading and manual signs for deaf learners. All of these studies were concerned with the overall effect of the presentations as measured by posttests which were administered after treatments.

Notes (1972) emphasize that "a caption should stay on the screen long enough to be read by the audience, b ut short enough in duration so not to obscure the picture" (p. 1). Hence, the captions in educational films are geared to a reading speed of approximately 120 words per minute.

The present study was an attempt to: (1) measure the attending behavior of the Ss toward still visuals, either with or without captions, and (2) measure the attending behavior toward the captions. The questions to be answered were: (1) Is there a difference in attending to the visuals with captions and those without captions?; (2) Is the presentation of the captions at the rate of 120 wpm adequate?; (3) Are there other variables, such as age and achievement reading level, which affect attention to the captions?

The study employed the conjugate reinforcement procedure using slides as stimulus material.

The paper provides an introduction to the problem, followed by a background and description of conjugate reinforcement. Then the experimental procedure is described. Finally, the results, discussion, and conclusions are presented.

Background

The conjugate reinforcement procedure is based on Skinner's (1953) operant psychology in behavioral science. In pointing out that any emitted response which leads to reinforcement has a higher probability of re-occurrence than a non-reinforced response Skinner implies that operant conditioning can be employed to enhance learning in instructional situations.

In a typical operant conditioning study, a specific response such as bar pressing or key pecking is reinforced by rewarding the S with a reinforcer, such as food or candy. It has been observed (Holland & Skinner, 1961) that a S, i.e. a pigeon, on being reinforced with food after emitting a response, tends to continue pecking as long as its responses are reinforced.

Conjugate reinforcement is an outgrowth of Skinner's basic operant conditioning technique. Instead of using food, the presence of the stimulus itself serves as a reinforcer. The conjugate reinforcement procedure was developed following studies by Baer (1969) and Lindsley (1962) which showed that Ss would respond to maintain the presence of pictures; thus, pictures were said to have reinforcing value.

A previous study on conjugate reinforcement with captioned slides was conducted by Richard Lewis (1973) at Computer Based Project in Syracuse with 18 hearing third-graders. The stimulus materials consisted of the individual frames from a 15-frame color filmstrip "New Quarters Are Made" and the captions from the filmstrip which were reproduced on a separate set of slides. Sound was not used in the study.

The experiment was set up so that the visuals were projected continuously for ten seconds each; however, the presentations of the captions were controlled by the Ss who would press the microswitch in order to produce the captions on the screen. Thus the visuals were constant and the captions, contingent on bar pressing, were the experimental variables.

Lewis concluded that the Ss attended to the captions in different ways. Some would watch the visuals before attending to the captions; conversely, others desired the captions immediately with each new visual. Some would maintain the presence of the captions throughout the presentation of the visual while others would watch the captions only for a few seconds. Attending behavior was also affected by the length of the captions.

Based on Lewis' findings, the present study was modified to control for the variability in the presentation of the captions; this was accomplished by including the captions on the visuals.

Method

Subjects. Ss were six students from Rome and St. Mary's schools for the deaf who reside in the Syracuse area. All the Ss selected for the study were between the ages of eight and fifteen and possessed an intelligence quotient within the normal range (85-115). The achievement grade level for the reading subtest, as measured by Stanford Achievement Test, ranged from 1.6 to 3.1 and the battery median from grade level 1.6 to 4.6. During the training session, each S spent about five minutes in the experimental chamber and was able to operate the response button.

Stimulus Material. A 48-frame color filmstrip, "The Brave Little Tailor", copied on 35mm slides, was employed in the study. Each slide contained either no caption, or a one-line, two-line, or three-line caption. It was assumed that the visual attractiveness (color, form, content) was randomly distributed throughout the presentation. The slides were projected by a Kodak Carousel projector without audio soundtrack.

Apparatus. The experiment was conducted in a sound-attenuated enclosed chamber, measuring 6'x8'x8'. The enclosure was divided into two sections with a 14'x14' rear projection screen mounted on the dividing wall. The S's section measured $4\frac{1}{2}$'x6' and was illuminated by two fluorescent fixtures on the dividing wall. The room was equipped with a chair facing the rear screen. The stimulus material was presented on the screen which was at eye level of the S when sitting, and approximately three feet from the S's head. A microswitch was housed in the right arm of the chair.

Programming and recording equipment were located in the E's section measuring 3'x6'. The programming equipment included a Coxco cassette tape recorder which advanced the slides by inaudible impulses and recorded the slide changes on the Harvard cumulative recorder. The slides were projected on a mirror which reflected the image on the rear screen. A visual conjugate reinforcer (VCR) was also housed in the E's section. The VCR was programmed so that each button press produced the stimulus for one-half of a second.

Slide changes and responses were recorded on a Harvard Cumulative Recorder Model C-3. The paper speed was set at 1cm/10 seconds, or 6cm/minute.

Procedure. Each of the 48 slides was projected for ten seconds, totaling eight minutes of projection time. Each new slide was initially presented for one second, and withdrawn. The presence of the visual during the last nine seconds was thus contingent on the pressing of the microswitch. Each press presented the slide for half a second; therefore, in order to maintain the presence of the visual throughout each ten-second interval the S had to respond at least 18 times.

Ss were brought to the enclosure and told it was a viewing room. The E asked the S to sit down and look at the screen. The E then explained to the S that he would show some pictures, and that they would fade out after a while. The E then said, "If you want to see the picture again, you must push the button, let go, and push again, like this". The pressing was demonstrated and the S had an opportunity to

practice it during a series of 15 training slides. The S was also promised some candy upon finishing the experiment.

Analysis. Data were collected from the responses on 20 slides of which ten slides were uncaptioned, five slides contained two lines of caption, and five slides contained three lines of caption. These slides were selected randomly, with the exception of the film containing three lines as there were only five in the presentation; all of them were included in data analyses. None of the first eight slides were included in the analyses; they permitted further practice under actual experimental conditions after the training session.

Responses for each of the 20 slides, as recorded on the cumulative recorder, were counted. A simple analysis of variance was performed to investigate the differences in attending behavior toward the three groups of visuals. The Pearson Product Moment Correlation coefficient was computed to indicate the relationship between the dependent variables and the student characteristics.

Results. Data were collected from six Ss; however, the results of the last four S were included in the final analyses. The record of the first two Ss is shown in Figure 1. Subject Y was instructed to press

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Insert figure 1 here

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the microswitch as long as he wished to attend to the visual, and to advance the slides by pressing another button. However, the figure shows

that he pressed the microswitch at an average of three times (total 128 presses) before changing the slides, and that he spent an average of five seconds for each visual, totaling 4:06 minutes for the total presentation.

The procedure was revised for the second S so that each slide was available at a fixed interval for ten seconds each. However, Figure 1 (Points D) shows that Subject Z would emit some responses for a while before pausing. Then the S would press the switch again. This pattern seemed to indicate that the S was pressing to find out if the slides had been already advanced or not. Because of this unexpected behavior the procedure was again modified. As a result, each new visual was presented for the first second to inform the Ss of the new visual, and then withdrawn.

The responses emitted by each of the remaining four Ss are recorded in Table I which show the mean number of presses for each of

TABLE I

AVERAGE NUMBER OF RESPONSES FOR EACH SLIDE

Subject	Visuals with captions	Visuals without captions
A	20.4	21.0
B	22.8	20.6
C	31.0	30.2
D	18.4	19.4

the ten captioned visuals and ten uncaptioned visuals. It is noted that Ss B and C attended to the captioned visuals longer than those without captions; conversely, A and D responded higher to the uncaptioned slides.

Table 2 shows a F of .0090, indicating no significant difference

TABLE 2

SUMMARY TABLE--ANALYSIS OF VARIANCE

Source	Sum of Squares	df	Mean Square	F
Between groups	.25	1	.25	.0090
Within groups	166.27	6	27.71	

in means of responding between the captioned and uncaptioned slides.

Table 3 records the mean number of responses emitted by each S

TABLE 3

AVERAGE NUMBER OF RESPONSES FOR EACH SLIDE

Subject	Visuals with 3-line captions	Visuals with 2-line captions	Visuals without captions
A	19.2	21.6	21.0
B	23.2	22.4	20.6
C	30.0	32.0	30.2
D	23.2	13.6	19.4

for five slides each of the three-and two-line captions, and ten uncaptioned slides. The data shows that Ss B and D maintained the three-line captions longer than the two-line captions, but S D attended to the uncaptioned slides longer than to the two-line captions.

The summary table of analysis of variance, shown in Table 4, indicates a F pf /0549. The result suggests no significant difference

TABLE 4

SUMMARY TABLE--ANALYSIS OF VARIANCE

Source	Sum of Squares	df	Mean Square	F
Between groups	4.83	2	2.41	.0549
Within groups	394.52	9	43.83	

in attending to the different lengths of captions. Thus, it cannot be determined if the presentation of the captions at the rate of 120 wpm is adequate.

Inasmuch as the data on only four Ss were collected, the data for the third question--are there other variables, such as age and achievement reading level, which affect attention to the captions--was not analyzed.

Discussion

The study failed to produce any significant findings; this might be attributed to a small number of Ss available for the study.

However, if the raw data is representative, it is questionable if a larger sample would produce a significant difference.

The fact that the study was conducted during the summer, and in an atmosphere unfamiliar to the Ss, might have a bearing on the results.

It is probable that the eight-minute presentation with 48 slides was too much for the S, but all Ss maintained switch pressing at approximately the same rate throughout presentation.

Conclusions

Although the study failed to produce any significant findings, it is believed that the study is worth pursuing. It is suggested that in further studies the ½-second presentation of the stimulus for each switch press be reduced to one-third or one-fourth of a second in order to produce a more sensitive measurement of attending behavior.

In retrospect it is the opinion of the E that the first procedure which allows for the S to advance the slides himself, was discarded too hastily. The S was less than ten years old; therefore, his behavior should not be generalized to an older learner. It is believed that this procedure should be attempted again. It is also suggested that a further experiment which would allow the S to either advance or to go back to a previous slide be tried.

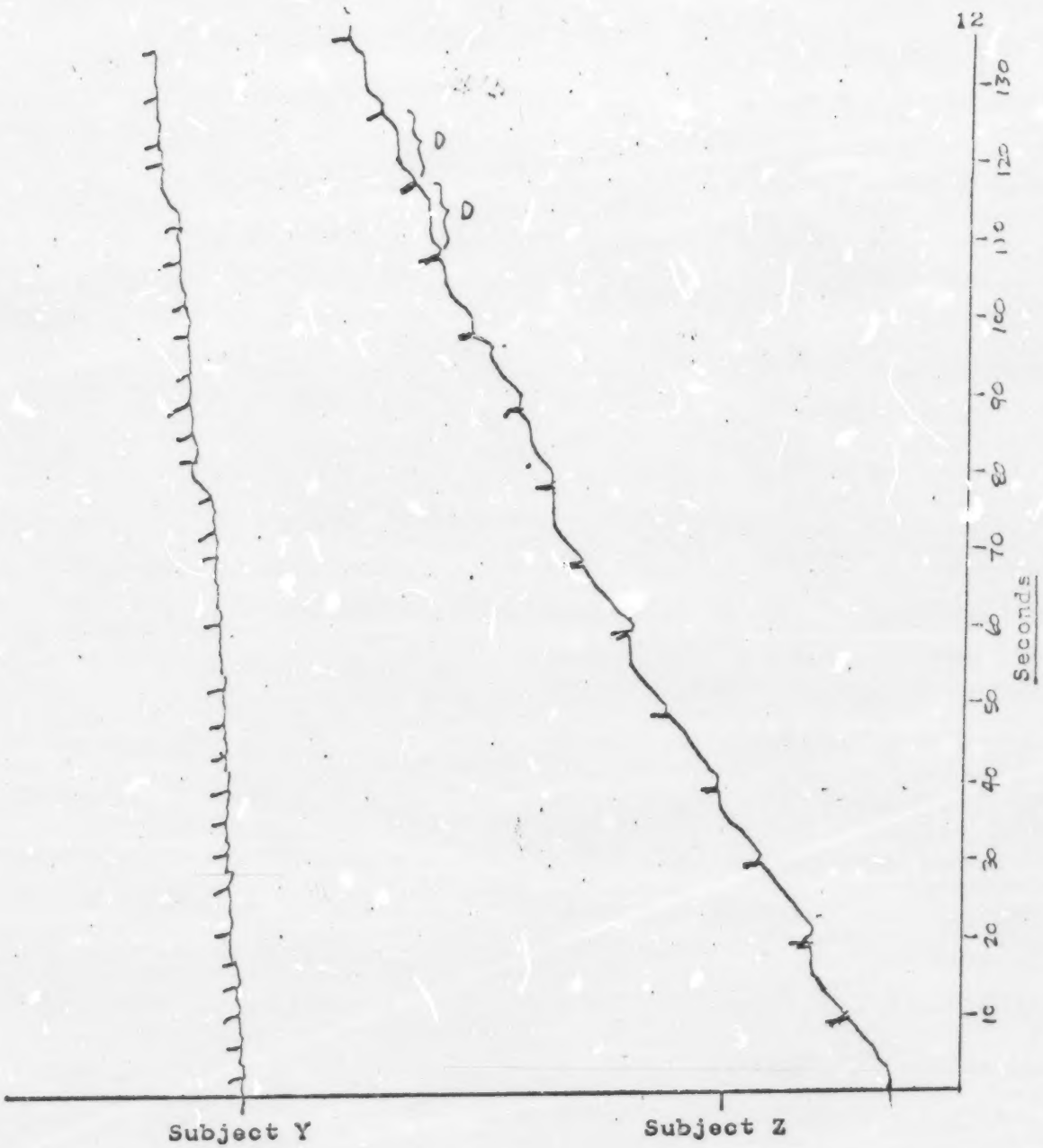

Figure 1. The response records of two Ss. Points labeled A indicate when the slides were advanced. Responses emitted are indicated by B and a pause in responding is indicated by C.

TABLE 1

AVERAGE NUMBER OF RESPONSES FOR EACH SLIDE

Subject	Visuals with captions	Visuals without captions
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B	22.8	20.6
C	31.0	30.2
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SUMMARY TABLE--ANALYSIS OF VARIANCE

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